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USSR Report

MACHINE TOOLS AND METALWORKING EQUIPMENT

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INDUSTRY PLANNING AND ECONOMICS

BASIC PLANS FOR ECONOMIC, SOCIAL DEVELOPMENT UNTIL YEAR 2000

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODSTVO in Russian No 1, Jan 86 pp 2-4

[Text] In a relatively short period of time, our country has taken itself out of its eternal backwardness, attained reached the heights of social progress and made great strides in all spheres of life. Soviet society has entered the stage of developed socialism...

The chief directions for economic and social development in the USSR for 1986-1990 and the period leading up to the year 2000 have been defined by specific plans for the realization of the CPSU's program...

Chief Directions and Tasks for the Economic and Social Development of the USSR Until the Year 2000

We must raise our production forces and ratios to a totally new level of potential, greatly accelerate scientific and technical progress, make rapid advances in strategic area of economic development and create new industrial potential equal in magnitude to all that we have achieved up to now.

We must considerably improve working conditions and more quickly reduce the amount of manual labor to where it comprises about 15-20 percent of all production work.

Industry has to go into predominantly intensive forms of development. Worker productivity must be increased to accelerate the rate of economic growth. We must increase the national product by nearly twice.

We must raise the growth of national income and production in all branches of material production by increasing labor productivity. Worker productivity must be increased by 230-250 percent. Strong progress has to be achieved in implementing our program for raising worker productivity to the highest world standards...

Industrial energy consumption must be reduced no less than 140 percent and metal consumption must be cut in half. Natural and material resources must be more extensively used and waste and inefficiency has to be eliminated as much

as possible. We must begin to make broad use of secondary resources as well as by-products.

Scientific and technical progress must undergo the utmost degree of advancement and the results must be used everywhere in industry and management, service and everyday life.

The national economy must take itself to the frontiers of science and technology. We have to efficiently exploit socialism's inherent forms and methods of scientific and technical progress. The integration of science and industry has to be strengthened and organization must be improved while the amount of time required for research and development and the assimilation of scientific discoveries, technical innovations and inventions must be reduced.

Product and service quality must be raised to the level of the best domestic and international standards...

The industries critical to scientific and technical progress and the execution of social tasks must undergo still greater growth.

We must increase our output of industrial products by no less than twice.

We must considerably hasten the development of the machine industries and fundamentally improve the technical quality of its products. We must create and assimilate the means of producing a new generation of technology that can increase labor productivity and considerably lower material costs. The material, scientific and technical base of the machine-building industry must also be strengthened.

Economic, scientific and technical cooperation with developing nations has to be expanded. Mutually profitable and advantageous economic ties with interested capitalist states must be developed.

The Basic Tasks For Economic and Social Development of the USSR in 1986-1990

The 12th Five-Year Period has a very important part to play in the realization of the strategic tasks of the coming 15 years. It should become the focal point for all areas of the country's economic and social development.

The main task of the 12th Five-Year Period is to increase the rate and efficiency of growth in the national economy through hastening scientific and technical progress, technical re-equipment and renovation of industry, intensive use of our created industrial potential, improvement of management systems and mechanisms and the subsequent achievement of better living conditions for the Soviet people.

On the basis of the chief task of the 12th Five-Year period:

We must increase national income used for consumer needs and accumulation by 19-22 percent and we must provide a total increase in national income through better worker productivity. Material consumption has to be lowered by 4-5

percent, energy consumption by 7-9 percent and metal consumption by 13-15 percent.

We must increase industrial production by 21-24 percent. This includes a 20-22 percent increase in the output of means of production (group A) and a 22-25 percent increase in the production of consumer goods (group B).

We must speed up the rate of growth in materials-processing industries. The level of production in these industries must rise by 25-28 percent while the production of fuel and raw materials industries has to rise by 11-13 percent...

We must considerably accelerate the growth of machine-building industries and increase their level of technical sophistication...

We will have to achieve a breakthrough in intensification of our production through broader use of scientific and technical accomplishments and make more progress in the structure and organization of industry and through enhancing labor, technological and management discipline.

Production apparatus has to be renovated mainly through replacing low-efficiency equipment with advanced high-output devices. We must conduct a complete inventory of our basic industrial resources and increase their active component by more than three times. We must retire no less than twice as much obsolete basic production resources as in the 11th Five-Year period...

Overall labor productivity in the general economy must rise by 20-23 percent while that of industry will have to go up by 23-25 percent. Increased labor productivity can produce the entire increment in industrial production.

We must make it our primary goal to improve the quality of goods and services as as the most important factors to intensification of our economy and more fully satisfy the growing needs of the economy and of our people.

We have to strengthen the economy. We must work constantly to efficiently and economically use all types of resources and reduce waste and achieve a faster transition to waste-free and less resource-intensive technologies. We must considerably improve our use of by-products and production wastes and develop facilities for processing them.

We must create more favorable conditions for highly-efficient work, improve working conditions and job safety and enhance work ethics and discipline. We must more actively introduce scientific organization of work and make efficient use of work time. A single state system for planning, accounting, certification and streamlining of work must be created. We must consistently reduce the use of manual and heavy physical labor especially in loading and unloading work, storage and other auxiliary operations.

Acceleration of Scientific and Technical Work and the Development of Science

In order to fulfill our key political and economic tasks, we must hasten scientific and technical progress. We must give strong emphasis to the role taken by science and technology in qualitative transformation of production forces, reorient our economy toward intensification and increase the efficiency of Soviet industry. We must aim our scientific and technical progress toward the resolution of social problems.

The technical quality of industry has to be thoroughly enhanced, above all by reorienting the investment and structural policy and concentrating resources on more important directions of progress such as electronics, nuclear power, large-scale automation, production technology and the processing of new materials. During the next 5 years, we must achieve no less than a two-thirds growth in worker productivity through the use of scientific and technical innovations.

We must carry out an entire complex of measures to improve production technology. During the 12th Five-Year Period, the use of progressive base technologies must be increased by 150-200 percent. Completely-new electron-beam, plasma-jet, impulse, biological, radiation, membrane and chemical technologies must be introduced to the national economy on a much broader scale. The use of these technologies could increase worker productivity by many times, make our resource use more efficient and lower material consumption by industry.

We must very consistently work to increase the organizational and technological flexibility of industry. This entails the introduction of automated systems to various areas of industry and especially to work in planning and the management of equipment and technological processes. Industrial automation will have to be increased by about 100 percent. We must create large-scale automated processes that can be quickly and economically adjusted.

We must accelerate the development and production of new generations of high-efficiency technology and start producing systems of machines and complexes of technological equipment. It will be necessary to increase the total volume of of computer production by 200-250 percent. The scale of use of modern high-output computers of all classes has to increase. We must continue to create and increase the efficiency of the work of group-use computing centers, integrated data banks and of data-processing and transmission networks.

In the development of new equipment and technologies, it is necessary to more fully use materials with previously assigned properties and especially advanced construction materials such as synthetic, composite and super-pure materials and others that can produce a high rate of savings in our economy.

We must increase by 190-210 percent the percentage of industrial production of higher-quality items, improve the reliability and performance of equipment and complete the introduction of large-scale systems of quality control. It will be necessary to review standards and technical conditions for production and

orient them toward higher international achievements. The quality of work on certification of industrial production must be improved in order to provide a more objective assessment of production quality. On the basis of prospective scientific and technical achievements, we must standardize our technologies and intensify the industrial and interindustrial unification of machines, components and parts.

Work on inventions, patents and licensing must be improved. We must do everything possible to create favorable conditions for the faster introduction of inventions and greater efficiency into the national economy...

The fundamental problem facing us now is to strengthen the bonds between science and industry and to create organizational forms for integrating science, technology and industry that will allow the precise and fast practical implementation of newly-conceived scientific ideas. Scientific organizations have to be made more responsible for the quality of their research and development work and we must make the fullest possible use of their efforts...

It will be necessary to considerably enhance the quality and results of industrial science and factory-sector research. We must expand our network of scientific and production associations, orient industrial research organizations toward work to create and introduce new generations of equipment and manufacturing complexes and constantly work at improving production equipment and technology. Scientific and production associations and establishments must include branch scientific-research, design and technological organizations whose efforts will have to be concentrated on branch-level research. Design, technological and other engineering services must have a greater role in the achievement of progress and the timely application of scientific and technical advancements.

The Machine-Building Industry

The primary task of this industry is its thorough reconstruction and faster growth. This above demands greater emphasis in the production of machine tools, computers, instruments and electronics. The increment of increased production in these branches will have to outstrip overall machine-industry production by 130-160 percent.

We must increase by 40-45 percent our output of machine tools and metal-working equipment.

We must cut by three or four times the amount of time needed to develop and master new technology. It will be necessary for the productivity and reliability of all newly-assimilated technologies to better that of existing technologies by no less than 150-200 percent.

Within economically-justified limits, the per-unit power of machinery and equipment must be increased while per-unit production costs will have to drop.

We must introduce flexible manufacturing systems on a broader scale along with computer-aided design systems, automated lines, machines and equipment with built-in data processors and numerical control, robotics, rotary complexes and rotary-line processes.

We must increase the machine-building industry's use of advanced structural materials such as rolled stock from low-alloyed roll-formed, shaped and precision-shaped steel, metallic powders and plastics. During the 12th Five-Year period, we must reduce the per-unit metal content of our machinery and equipment by 12-18 percent and lower unit energy consumption by 7-12 percent. It will also be necessary to reduce our consumption of ferrous rolled stock (per million rubles of machine-tool production) by an average of 26-28 percent, steel pipes by 18-20 percent and nonferrous rolled stock by 21-23 percent.

We must increase the work load of our industrial equipment and by 1990 bring the equipment operation shift coefficient up to a level of 1.6-1.8. The shift operation factor of NC equipment and automated lines will have to be raised to 1.9 and that of flexible production modules and systems must be increased to 2-2.5.

Labor productivity will have to be increased by 39-43 percent and production costs will have to be lowered by 9-11 percent.

In the machine and tool industries, we must hasten the production of advanced technology required for the re-equipment of the machine-building industry. The structure of produced equipment has to be improved and we must substantially increase our manufacture of new types of efficient, press, forging, metal-cutting, casting and lumber-handling equipment while raising its level of productivity by 150-160 percent.

Production of NC metal-cutting lathes, "machining center" lathes, heavy and special-purpose lathes and presses, equipment for automating the assembly of large objects in the machine-building industry, rotary, rotary-conveyor and other types of automated lines for machine building and metal working must be increased to meet future demand and the production of high- and super-high precision machine tools will have to be substantially increased.

We must increase production of automated and robotic complexes and lines, flexible metal-working systems including those used for sheet-metal stamping and die forging, manufacture of parts from metallic powders, plastics and other materials, progressive instruments and manufacturing accessories, modern automation control devices.

We must expand our specialized production of tools. The production of high-output cutting tools and unturned sheet metal from hardened alloys and metal ceramics with multi-layer abrasion-resistant coatings. It will be necessary to make broader use of material-hardening technology.

The instrument-building industry will have to increase the rate of manufacture of high-performance industrial automation systems and especially those used

to control manufacturing processes. We must more quickly increase our output of computer-aided engineering design equipment, high-powered small computers, personal computers, numerical control systems for multi-purpose machine tools and flexible production modules and programmable command apparatus for various types of equipment. The production of computer and automation software must also increase.

We must create and master series production of automated systems for diagnosing machinery and equipment, means of monitoring processes without interrupting them, complexes of new devices that can check the quality of industrial and agricultural products and the state of the environment. There must be an increase in our production of devices that monitor and regulate the consumption of fuel and energy and of automation used in scientific research.

Improvement of Economic Management

We must more greatly improve our management of the national economy. The role of the basic element of industrial production, the science-production and production associations and establishments, must be enhanced and their rights and duties must become organically intertwined. The economic independence of associations and factories must be greatly enhanced and they have to be given greater opportunities to re-equip themselves and improve their production and planning.

The economic responsibility that associations and factories have for the results of their operation will have to be increased. They must meet their production quotas and make better use of all types of resources. We must see that economic mechanisms as much as possible encourage more efficient and higher production, the introduction of new equipment, constant improvement of technology and greater product quality.

We must see that the amount of resources alloted associations and factories to expand their production, increase wages and solve social problems is strictly determined by their economic results and worker collectives will have to be more independent in how these alloted resources are used. Necessary material and technical resources must be provided for work financed through association and factory funds and bank credits.

We must improve the forms and organization of socialist competition and orient it toward the attainment of a high level of labor productivity.

In accordance with the aims of the April 1985 Plenum of the CPSU Central Committee, our chief task at this time is to achieve a breakthrough in work and revolutionize all realms of economic activity. We must achieve greater results at lower costs and make the greatest possible use of all of the resources available to our country. Our powerful present economic, scientific and technical potential and all existing reserves must be applied to this goal. It is now necessary for worker collectives, the party organizations, the soviets and economic organs and all public organizations throughout the country to achieve great results and be able to skillfully manage production. In every association and factory, in every shop and production section,

it must be determined where the greatest results can be achieved at the least cost.

Above all, we must bring involve what is our chief and inexhaustible reserve -- the human factor o people, good organization, discipline and order.

The CPSU Central Committee expresses its firm conviction that the party's goals for the 12th Five-Year Period and the period up to the year 2000 will be attained. This in turn will still further reveal the creative forces of socialism and our Soviet Fatherland will become richer and even more powerful. The creative work of the Soviet people and the unshakable unity of people and party guarantees the attainment of these goals.

"The development of Soviet society will largely be determined by completely new breakthroughs in the economy, its intensive growth and a higher degree of efficiency everywhere...Our main task is to quickly start producing new generations of machinery and equipment that will make it possible to introduce advanced technologies, greatly increase labor productivity, lower material costs and increase the return on our investments" (From a speech by General Secretary of the CPSU Central Committee M.S. Gorbachev to the April 1985 Central Committee Plenum).

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INDUSTRY PLANNING AND ECONOMICS

IMPROVING WORK OF MINISTRY'S PARTY ORGANIZATION

Moscow PARTIYNAYA ZHIZN in Russian No 1, Jan 86 pp 47-50

[Article by V. Mukhin]

[Text] The report and election meeting of the party organization of the Ministry of the Machine Tool and Tool Building Industry concentrated its main attention on the party committee's work on increasing the responsibility of communists of the ministry apparatus for raising the technical level and quality of production output in the light of the requirements of the April (1985) CPSU Central-Committee Plenum. The decree of the CPSU Central Committee on this question, which is of important partywide signifance, aimed at such an approach. The directives of this document, which were widely reflected in the party committee's accountability report delivered by its secretary L.I. Chuprakov, and in statements of participants of the discussion and in the meeting's decree, were wholly and entirely approved by the communists, who accepted them as a guide to action and as the basis of all practical work.

It was noted with satisfaction that the party organization is directing its efforts to educate the ministry's personnel to the need of working conscientiously, with initiative and with a full return and is increasing demands on them for ensuring good organization, order and discipline in all parts of management. Questions were submitted for discussion by the communists relating to fulfillment of plan targets and socialist commitments, improvement of management and development, modernization of capacities and raising the productivity and reliability of produced equipment.

As emphasized at the meeting, the work done by the party organization has largely contributed to the sector fulfilling in the course of the entire 11th Five-Year Plan the plan targets for growth of industrial production volume and other economic indicators. The share of automated equipment with numerical control in the total volume of machine-building production has grown.

In discussing the accountability report of the party committee, the participants of the meeting proceeded from the conclusion formulated in the decree of the CPSU Central Committee to the effect that there has as yet been no radical improvement in the work of the party committee on mobilizing

apparatus communists to fulfill the party-imposed tasks of accelerating scientific and technical progress.

"Complex retooling plans for the 12th Five-Year Plan still do not exist at some plants," A.A. Trofimov, secretary of the party buro for management of planning and capital construction, pointed out in his speech. "No provision is made in many plans for the use of progressive equipment and the employment of resource-conserving and low-waste technologies. Personnel of all-union industrial associations do not have the right to formally approach approval of the proposed decisions for planners, as it sometimes occurs, but should actively participate in the search for optimal variants."

In the adopted decree, the CPSU Central Committee obliged the party committee and the ministry collegium to implement concrete measures ensuring the unconditional fulfillment of the decisions of the April and October (1985) CPSU Central-Committee Plenums, the most important decrees of the party and the government on development of machine building and directives of the conference at the party's Central Committe on questions of accelerating scientific and technical progress. In speaking of these measures, the communists confirmed that the ministry's supervisory personnel should reorganize their work in the spirit of present requirements, overcome complacency, and demandingly evaluate achieved results.

The chiefs of all-union production associations--Comrade Trachuk of Soyuzkuzmash [Forging and Pressing Equipment Industrial Association], Comrade Cheburakov of Soyulitmash [Foundry Equipment Industrial Association] and Comrade Romanov of Soyuzdrevstankoprom [Woodworking Equipment Industrial Association]--were sharply criticized for their obsolete approach to organization of operational activity. In these associations nearly one enterprise in three was ordered to cease production owing to poor quality of its products.

Participants of the meeting leveled major complaints at the managers of the ministry's technical administration, especially at Comrade Pokasyuk, chief of the administration, and Comrade Lakhtyukhov, the party buro secretary, for conservatism in work. Concern was expressed that developmental plans for science and technology are being diverted by unimportant priorities and do not contain concrete targets for a significant improvement in products being put out. The fairness of these complaints was confirmed by a recently conducted analysis, which showed that a large portion of the equipment examined was improperly awarded the state Seal of Quality and did not measure up to the best foreign models.

Examining the problems of boosting quality and the organizing role of plans for the creation of new equipment, the communists emphasized the importance of increasing the demands on scientific-research and planning technological institutes of the sector. It was stated for example that the Lipetsk Oblast People's Control Committee brought up before the ministry the question of the advisability of liquidating the local affiliate of VPTIlitprom [All-Union Technological Planning Institute for Casting, Stamping, and Welding Construction], which now resembles more of an office for collection of statistical data than an organization where interesting ideas and developments

should be produced. Proposals were submitted for strengthening the creative association of science and production for the purpose of carrying out a scientifically based technical policy.

The meeting's participants concretely discussed ways of realizing the demand brought up in the CPSU Central-Committee's decree for fuller use by the ministry's party organization of the right of control over the work of the apparatus in regard to fulfilling directives of the party and the government. Serious criticisms were directed at the party committee concerning the fact that an atmosphere of businesslike criticism and self-criticism has not been created in the ministry's collective and there are violations of executive discipline as well as manifestations of bureaucratic and "armchair" methods of management. The technical administration has been corresponding now for a year with Soyuzstankoprom [General Purpose Machine Tool] All-Union Production Association (which is in the same building separated from it by two stairwells) on the question of devising equipment for light conductors--a question which has not been resolved up to the preent time. The labor and pay administration is involved in preparing and distributing to plants all sorts of obligatory orders. Speakers recommended that the party committee exercise a more active influence on improving the work style of the apparatus as well as constant control over its work under the new conditions of management and over the broad utilization of the new managerial possibilities.

"We must know more deeply the state of affairs in the localities and visit there more frequently for the purpose of providing practical assistance to labor collectives," B.M. Pivovarenko, chief of Soyuztochstankoprom [Precision Machine Tools] All-Union Production Association, noted. "Specialists of enterprises are frequently obliged to go to the ministry and spend a long time visiting offices solely for the purpose of obtaining an official signature to some document. This is detrimental to work. It would be useful to send to lagging plants brigades made up of competent specialists capable of exerting a positive influence on their work."

The meeting's participants closely analyzed the practice of reports by communist administrators that has developed in the party organization. It was pointed out that discussions of such reports were purely formal in nature and did not provide the necessary educational impact. The reports of deputy ministers are not being heard at all at party committee meetings. Criticisms were leveled at the meeting at individual personnel who were tactless and arrogant to subordinates. It was emphasized that communist administrators are obligated to show an example of ideological conviction and moral purity, a creative approach to work and intolerance of routine and stagnancy and to participate more actively in the life of the party organization and fulfillment of party directives.

The meeting's participants listened to a report of party committee deputy secretary O.I. Panko, who presented a report on the work of commissions in monitoring the work of the apparatus. The commissions made a definite contribution to improving equipment deliveries to a number of enterprises. But they frequently lacked initiative and determination in analyzing the work of individual parts of the ministry apparatus and in eliminating defects. New personnel were elected to the commissions. They were instructed to intensify

control over the acceleration of scientific and technical progress, and over the delivery of equipment to installations of top state importance and capital construction.

The CPSU Central-Committee decree obliged the party committee and the ministry collegium to increase demands on heads of administrations and departments for implementation of the party's cadre policy. In this connection, it was pointed out at the meeting that haste was inadmissible in solving cadre questions resulting in the appointment to responsible positions of persons of low competence, incapable of organizing work. It was emphasized that the party committee must determinedly strive to reinforce leading subdivisions with highly qualified heads with initiative and to promote young and promising specialists.

The communists considered further improvements in party organizations' supervision over structural subdivisions of the ministry as an important direction in increasing party influence in the collective. It was emphasized that it is necessary to develop here in every possible way criticism and self-criticism, especially criticism from below, and not to permit ostentation and embellishment of reality.

"In our shop's party organization lapses were not always closely analyzed nor were demands made on specific persons guilty of breakdowns at work," V.A. Fedotov, party buro secretary of Soyuztyazhstankoprom [Heavy and Unique Machine Tools] All-Union Production Association, admitted. "For this reason, problems that we ourselves should solve sometimes were submitted for consideration by the party committee. The fulfillment of precongress socialist commitments and acceleration of the sector's development provide a serious test of the efficiency of the party organization of each subdivision of the ministry, and this work must be conducted with high demands on oneself."

Questions of increasing the responsibility of the ministry's supervisory cadres for developing collectives' creative activity were examined at the meeting in the light of the directives of the CPSU Central Committee. Socialist competition is still weakly aimed at intensification of production, economy of resources, raising of the technical level, competitiveness and quality of products. And yet there are many places for application of the initiative of workers and specialists: the relative share of progressive equipment involved in production is low; measures for reducing the material intensiveness of lathes and machines are inadequate; the shift coefficient of equipment operation is slow in being raised; losses from bad workmanship have grown. It was proposed to make better use of labor competition as a stimulus for the solution of these and other problems and to strive for dissemination of the experience of the AvtoVAZ Association collective in finding and utilizing internal reserves.

In the course of the meeting, addresses were made that were not distinguished by a high level of self-criticism by individual workers of their work and the possibilities for improving it.

When B.A. Shchipilin, the chief designer of a department of the technical administration, came to the podium, it seemed that he should have answered the reasoned criticisms directed at the administration's personnel, analyzed the causes of the permitted defects, and told of measures for their elimination. Instead of this, he spoke in detail about the responsibility of other subdivisions of the apparatus and enterprises subordinate to him for ensuring high quality of produced machine tools.

A.V. Derzhavin, chief of Soyuzinstrument [Cutting, Control, and Measuring Tools] All-Union Production Association, admitting that many enterprises in the association were not fulfilling plans for the basic products list and sale of products taking into account contractual deliveries, gave assurances that the tasks facing the subsector would be resolved and complained of the poor work of ferrous metallurgy which was producing a shortfall of high-speed cutting steel. At the same time, facts show that the association has paid little attention up to now to the solution of developmental questions of enterprises whose fixed capital is worn out and obsolete and that these questions are timidly brought up before the ministry's leadership.

Unfortunately, in the party committee's accountability report, not all propositions were distinguished by the requisite self-criticism.

The speaker asserted, for example, that in the sector "plan and labor discipline has grown and the practice of 'adjustments' has basically stopped." But, as can be seen from the actual report, the number of lagging enterprises not only was not reduced but, on the contrary, had grown 1.7-fold in the past 2 years. Cases of 'adjustments' and nonfulfillment of plan targets by enterprises have not been arrested, have not been properly evaluated by the party, and at times they are even condoned. In 1986, at the request of the ministry, the USSR State Committee for Science and Technology granted nearly 40 extensions of deadlines for the creation of new types of equipment.

Or take the assessment of measures for improving the party committee's work style made by the speaker. According to what he said, there were twice as many paragraphs than before in decrees adopted by the party committee containing specific instructions as to what should be done, by whom and in what time periods; and control for accomplishment of what was designated was made stricter. But the practical return from all this is small. The fulfillment of many decisions adopted recently has not been verified, and they remain unrealized because of low demands on personnel for the assigned task.

Certain questions were touched upon at the meeting relating to the improvement of the political educational activity of the ministry's party organization. True, the speaker spoke a little about this. Several participants of the discussions supplemented his remarks. Propagandist G.A. Drabkin directed attention to the fact that in classes all the attendees should work for a high degree of participation, conduct creative discussions more frequently, and not get involved in reading previously prepared notes. He expressed the wish that the party committee better provide propagandists with current methodological materials. But there was no detailed discussion about boosting the effectiveness of ideological work, or about overcoming the isolation of political and economic education from the world of pressing problems in the

development of the sector. Major responsible tasks now face the sector. In conformity with the party's program directives, the draft of Basic Directions of Economic and Social Development of the Country for 1986-1990 and for the Period to the Year 2000 provides for the priority development of machine-tool building compared to machine building as a whole. Retooling and the dynamic progress of the entire economy largely depend on this.

In characterizing the work facing us, Minister B.V. Balmont noted that the growth rate of commodity-production output of machine-tool building was set for 1986 in the amount of 7.8 percent as against the average annual 6 percent of the 11th Five-Year Plan. In the new 5-year plan, twice as much capital investment as in the preceding 5-year plan is being allocated for retooling and modernizing enterprises and creating additional capacities. Production of industrial robots, machining centers, flexible modules, machine tools with numerical control, automatic and semiautomatic lines and progressive tools has grown significantly.

At present, the development of a general scheme for management of the sector taking into account the requirements of scientific and technical progress, is in the final stages. The meeting stressed the importance of eliminating excessive links, of personnel reductions, and of amalgamating production and scientific-production associations and subordinating them directly to the ministry. The main thing is to have a unified sector staff of the to fully satisfy the needs of the national economy for production and enterprise management.

The meeting determined concrete ways of implementing the CPSU Central Committee decree on the work of the ministry's party committee and boosting the initiative and responsibility of all communists and all apparatus personnel for mobilizing the efforts of the workers for a worthy greeting to the 27th CPSU Congress and successful fulfillment of the plans of the 12th Five-Year Plan.

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INDUSTRY PLANNING AND ECONOMICS

PARTY DECREE URGES GREATER RESPONSIBILITY IN MACHINE INDUSTRY

Moscow SOBRANIYE POSTANOVLENIY PRAVITELSTVA SSSR in Russian No 2, Feb 86 pp 19-24

[Decree of the CPSU Central Committee of 29 November 1985: "Concerning the Work of the Party Committee of the Ministry of the Machine and Tool Industry Concerning Greater Responsibility of Communists on the Ministry Staff in Raising the Technical Level and Quality of Manufactured Goods in Light of the Demands of the April (1985) Plenary Session of the CPSU CC", published in Pravda, 13 December 1985]

[Text] The resolution observes that the Party committee of the Ministry of the Machine and Tool Industry, following the decisions of the April (1985) plenary session of the CPSU CC, is working to increase the responsibility of the communists in the ministry with regard to raising the technical level and quality of manufactured goods. There are tougher demands to implement the directives of the Party and State and assure managerial efficiency, order and discipline at all levels.

However, as yet there has been no radical improvement in the work of the Party committee in mobilizing the communists on the staff to implement the projects of the Party concerning faster scientific and technical progress. These matters have not been given due attention by the party organization. The directors of the ministry have not modified their work in the spirit of the needs of the moment, nor do they evaluate their results with self-criticism, which creates a feeling of self-satisfaction and adversely affects the situation in the sector.

The party committee has not exercised constant supervision of the staff in the new economic environment, the implementation of the economic experimentation in the sector, or the full utilization of its opportunities. The conversion to manufacture of highly-automated machine tools and machinery and the introduction of resource-sparing technologies is slow. There are major complaints as to the quality of manufactured goods: there are increased losses from rejects and repair warranty costs, and the number of enterprises assessed penalty sanctions by the USSR State Standard agencies has grown.

Cases of alteration and nonfulfillment of the new engineering projects have not stopped, nor are they receiving the due party evaluation. On many occasions,

by request of the ministry, the USSR State Committee on Science and Technology has changed its schedule of development of progressive equipment in the current five year period.

The party organization devotes insufficient attention to increasing the responsibility of the executive members of the ministry staff for promotion of the creativity of the masses and socialist competition among the workers. It has a poor attitude toward raising the technical level and quality of goods, intensification of production, and saving of labor and material assets.

The party committee and the board of ministers have not achieved a substantial improvement in the work style of the staff. They have not created an environment of mutual exactingness and emulation, useful criticism and self-criticism, nor have the bureaucratic methods of management been extirpated. Many of the staff have little knowledge of the situation in their offices. The directors of the ministry seldom appear among the workers. There are instances of disregard of publications, communications of the local agencies and notifications of the workers.

The party committee has relaxed its attention to the selection, assignment and education of the staff. It does not insist on filling the executive positions with highly-qualified and enterprising workers. It follows a timid policy of advancement of young and promising experts. Inconsiderate, often hasty selection of executives in some cases leads to appointment of incompetent persons, unable to manage the affairs, which results in frequent replacement of directors. No systematic work is being done to create an actual reserve of staff or properly organize the training and retraining of specialists and workers in connection with the conversion to manufacture and widespread introduction of new models of machinery and equipment. The political and economic teaching is divorced from the realities of development of the sector.

A further improvement is needed in the organization of work inside the party. The party committee and organizations lack future planning. The reports of the communist directors are formally received, without offering the requisite instructive guidance. It is not the practice to receive information from the deputy ministers at the meetings of the party committee. Nor is so useful a procedure as personal interviews employed. The practice of direct appointment of communists to party positions by the party committee is continuing, bypassing the party organizations of the workshops. Nor are the latter involved in remission of punishments. Some of the directors of the ministry underestimate the role of the party organizations of the administration level, do not participate in their work, seldom attend meetings of the party organizations of the workshops or sessions of the party committee and party bureau, and do not submit urgent matters of development of the sector to their consideration.

The party organization makes little use of the authority to supervise the activities of the staff in carrying out the directives of the party and State, as conferred by the charter of the CPSU. The commissions created for this purpose do not display initiative or persistence in elimination of defects. Despite serious omissions in the work of the ministry and its individual directors, the party committee has never reported such to the CPSU CC.

The CPSU Central Committee has called the attention of the party committee of the Ministry of the Machine and Tool Industry to the serious shortcomings in the administrative and political indoctrination work with regard to increasing the responsibility of the communists on the ministry staff in raising the technical level and quality of the manufactured goods. It has obligated the party committee and the board of ministers to implement specific measures assuring unconditional execution of the decisions of the April and October (1985) plenary sessions of the CPSU CC, the most important resolutions of the party and State concerning development of mechanical engineering in the 12th Five Year Plan and in the period up to the year 2000, and the directions of the CC conference pertaining to acceleration of the scientific and technical progress. In discussing the documents prior to congresses they should organize a thorough review of the tasks facing the sector in regard to intensification of production, raising of the technical level, competitiveness and quality of the products. They should direct the mobilizing force of socialist competition to the solving of such problems and make full use of the experience of the progressive sectors of the nation.

The party committee and the directors of the ministry have been told to concentrate the efforts of the communists and staff workers on improving the quality and the organizing role of the projects for development of new technology and the specific integrated programs for development of the machine industry, and to consult more actively the scientists of the USSR Academy of Sciences, the higher institutes of learning and the consumer ministries of the products in the formulation of such projects. The creative collaboration of science and industry should be strengthened in every way to pursue a scientifically informed technical policy and develop flexible manufacturing systems and new models of machinery that boost the labor productivity many fold. There should be greater utilization of the opportunities of cooperation with socialist countries in joint projects and production of progressive machine tools to satisfy the demand for such by the economy of the USSR and the member nations of the CEMA.

In the work to improve the administration of the sector (the resolution points out) more decisive steps should be taken to eliminate unneeded positions and reduce the personnel, strengthen the production and the scientific-production associations, reorient the enterprises to production of progressive technology to meet the demands of specific customers, and curtail the production of ineffective equipment. Collective discussion with the most active members of the party and leading experts should be used in examining the most serious and urgent problems of development of the sector.

The CPSU CC has urged the board of ministers, the party committee, the party organizations and the directors of the associations and enterprises to adopt emergency measures for accelerated retooling of the machine and tool industry itself, introduce modern metal-working equipment in the actual manufacturing process, increase the effectiveness of utilization of the scientific and industrial potential that has been created in the sector, and sharply improve the quality of the manufactured goods.

The resolution stresses that every incident of delivery of incomplete, poor quality equipment or tools to a customer, or improvident use of the capital assets, should become an object of major party scrutiny, calling the guilty parties to strict accountability.

The party committee has been told to adopt measures to further upgrade the party administration and ideological work. The management of the party organizations of the units in the sector should be improved, promoting criticism and self-criticism in every way, particularly criticism at the bottom levels, not tolerating "window dressing" or embellishment of the actual situation. There should be more personal interviews and reports by communists as to the fulfillment of their duties and expected requirements. The right to supervise the activities of the staff in carrying out the directives of the party and State should be used more fully, and the implementation of the adopted resolutions should be systematically verified. Zealous communist convictions, political sagacity and moral rectitude should be instilled in the communists and the members of the staff, actively assisted by the trade union and communist youth organizations in this matter. A working relationship should be established and expanded between the party committee and the party organizations of the associations, research institutes and ministries of related sectors.

The CPSU CC urges the party committee and board of ministers to demand more attention to the personnel policies of the party by the department and section heads. Employees with a poor attitude toward their duties and an uncritical evaluation of the situation under their control should be held strictly accountable, even to the point of being discharged from their positions.

The communist directors of the ministry are called upon to rely more heavily on the primary party organizations in their practical activities, to utilize more fully their prestige in the formation of a modern attitude toward socioeconomic problems in the staff members, to instill in the latter the necessity of working in new ways, with total dedication, fighting against laziness and stagnation. They should demonstrate the example of mastery of Marxist-Leninist theory and knowledge of economics, personal involvement in the political and indoctrination work of the party, enhancing the prestige and authority of the party committees in every way.

The central committees of the communist parties of the Union republics and the Moscow Gorkom have been told to develop and implement measures aimed at strengthening the supervision of the party organizations of the ministries and offices, increasing their role in improvement of the activities of the administration and constantly offering them the necessary assistance. More attention should be devoted to the secretaries of the party committees, in order to appoint politically-mature, energetic, highly-qualified specialists with solid convictions and excellent organizational qualities, having experience of working in elite party agencies.

It has been recommended to expand the retraining of managers of the ministries in economic and scientific-technical matters at the Academy of Economics of the USSR Council of Ministers, and to decisively improve the work of the institutes

in the sector with regard to upgrading the qualifications of managers and specialists.

The CPSU Central Committee has advised the party committee of the Ministry of the Machine Industry to critically analyze its activity in light of the present resolution and to remedy whatever shortcomings exist. It has demanded that the party organizations and managers of the ministry, associations, enterprises, research and design organizations promote in every way the creative initiative and activity of the workers and direct this toward a fitting welcome of the 27th Congress of the CPSU and successful implementation of the plans and socialist obligations for the 12th Five-Year Plan.

12717
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INDUSTRY PLANNING AND ECONOMICS

MEASURES FOR STIMULATING PRODUCTION OF HIGH QUALITY PRODUCTS

Moscow FINANSY SSSR in Russian No 3, Mar 86 pp 44-46

/Article by N.V. Sizov, RSFSR Assistant Minister of Finances and G.I. Bortsov, department head of the RSFSR State Price Committee: "Stimulating the Production of High Quality Products"/

/Text/ During a CPSU Central Committee conference held in June 1985, a discussion took place on the practical measures for implementing the concept of an acceleration in the country's socio-economic development based upon scientific-technical progress, as formulated during the April (1985) Plenum of the CPSU Central Committee.

A most important trend is the development of machine building and the mass production of a new generation of equipment, which is making it possible to raise labor productivity sharply and to automate all stages of the production process. Micro-electronics, computer equipment, instrument making and others must be developed at accelerated rates.

All of the union machine building ministries, upon whom the execution of the decisions handed down is primarily dependent, are actively developing specific measures aimed at developing the branches. However, as pointed out during the all-union conference, a need also exists for organizing and expanding the intra-departmental production of technological equipment and auxiliary machines. The production of machine building products at enterprises of republic subordination must be increased through technical re-equipping, the replacement of productive capital and by reducing the proportion of manual labor. The same requirements should be imposed with regard to this output as apply to the products produced by enterprises of the leading branches of machine building and the same methodological instructions concerning matters of price formation and the use of incentive stimuli and sanctions should apply.

Unfortunately, the machines and equipment produced at enterprises of the republic's industry are still inefficient, material-intensive and of low quality. During the first 6 months of 1985, the RSFSR State Price Committee approved 430 wholesale prices for machines and equipment developed for the very first time and subject to certification for quality. Incentive bonuses were established for 47 of them (11 percent of the overall number), with the maximum amount being assigned to only four. This means that 47 items possessed definite technical advantages and their operation will produce an economic

effect. The remaining items either did not produce an economic effect whatsoever or the effect was so negligible that it precluded the establishment of an incentive bonus for adding on to the price. Hence, when creating new equipment, a substantial increase in labor productivity or a reduction in production costs are not ensured.

It is our opinion that the design of new equipment in the republic's industry is in need of improvement. For example, the garage and automobile repair equipment produced by enterprises of Minavtotrans /Ministry of Motor Transport/ and the RSFSR Gosagroprom is inferior to the best foreign models.

During a CPSU Central Committee conference, emphasis was placed upon the need for accelerating the conversion of the motor vehicle pool over to diesel engines, the production of which will increase considerably during the 12th Five-Year Plan. Included among the principal consumers of new machines are enterprises of Minavtotrans and the republic's Gosagroprom, the repair and technical servicing of which will for the most part be carried out at departmental repair plants and workshops. Thus the design services must accelerate the development of modern equipment intended for the repair of diesel automobiles.

One reason for the lag in the production of modern equipment -- the duration of the schedules for its creation and introduction. From 4 to 7 years are required for the development of a new item, at the end of which time it has become obsolete. Thus a set of equipment intended for standardizing a diesel fuel apparatus was introduced into series production at the Krasnoufimsk Testing and Experimental Plant in 1984, that is, 4 years following acceptance testing. In 1974, the RSFSR Minavtotrans developed a unit for washing trucks, the series production of which commenced only in 1983. It was not until April 1984 that the wholesale price was presented to RSFSR Goskomtsen for approval.

Price formation plays an important role within the system of economic stimulation for the timely introduction of new equipment and for improving the quality of such equipment. Incentive bonuses -- up to 30 percent of the wholesale price -- are established for new and highly efficient products which are not inferior to domestic and foreign models. The new method approved by the USSR Goskomtsen (State Committee on Prices) stipulates that the bonus can be paid out for up to 50 percent of the economic effect and for products the production of which is based upon works considered to be discoveries or inventions, produced in place of imported goods, or for industrial robots -- up to 70 percent. In 1984, the production associations and enterprises located on the territory of the RSFSR, for the sale of highly efficient products, received 340 million rubles alone in the form of bonuses added on to the wholesale prices, or 120 million more rubles than in 1983. In the process, considerable increases took place in the withholdings for the economic incentive funds and payments into the budget.

The measures for further improving these stimuli are not meant to imply that new equipment must be produced at any price. It often happens that the ministries inflate the wholesale prices based mainly upon the individual expenditures of the production enterprises and not upon the average branch or economic effectiveness. For example, the RSFSR Goskomtsen, when examining a draft price presented for review by the RSFSR Minzhilkomkhoz for a new belt

elevator for delivering tulip bulbs to a hopper for distribution prior to planting, took into account its technical-economic indicators and lowered the price by more than twofold.

In many instances the production of new equipment is uneconomic owing to the fact that it is unjustifiably produced in small batches at experimental enterprises. Within the RSFSR Minzhilkomkhoz, for example, of 37 machine building related plants the series production of the new elevator was called for at those plants for which such output is not typical.

There have been many examples wherein, in the materials presented by ministries and departments for the approval of wholesale prices for new equipment, the computations have been artifi ially inflated for the purpose of obtaining higher prices and incentive bonuses. Use is often made in the computations of technical-economic parameters which have no effect with regard to raising the true effectiveness and machines and equipment of a low technical level are selected for comparison as analogs.

In a number of republic ministries and departments, the economic effectiveness is computed by the producing enterprise. They strive to raise the economic effect even for products which have not been recommended for the highest category for quality and the acceptance committees approve such computations in the absence of an adequate check upon their validity, particularly operational expenses. And such computations are viewed in a critical manner only during the course of approving a wholesale price, resolving the question of an incentive bonus being added to the price and including the prices on the state price list. For example, in the case of the K-245 stand, which was produced by the Zagorsk Avtospetsoborudovaniye Plant of the RSFSR Minavtotrans, the annual economic effect was computed and coordinated with the customer in the amount of 3,279 rubles. Following corrections, it was reduced to 679 rubles. A recommendation by RSFSR Minavtodor concerning the establishment of incentive bonuses for wholesale prices for highway multiple-unit machines produced by the Smolensk Testing and Experimental Plant for Technological Equipping has not been accepted owing to its low effectiveness.

Despite additional economic stimuli, the republic's industry is still only slowly mastering the production of highly efficient products and basically new articles. In 1985 the number of wholesale prices approved for new products showed almost no increase compared to the previous year. In our opinion, this is explained by the fact that a definite proportion of the republic's nomenclature of machine building products was included in a list not subject to product certification. According to the RSFSR Minrechflot, for example, such products constitute almost 80 percent of the overall production volume and their technical level is not controlled by the organs for standardization. This precluded the need for the ministries and departments to develop basically new machines and equipment and thus they concerned themselves only with the partial modernization of products mastered earlier.

At the present time, all of the lists for such products have been abolished. The new lists call mainly for spare parts and completion products for articles that have been removed from production but which are still in operation and also for simple types of products, that is, in complete conformity with the existing system for certifying products according to two quality categories.

In the interest of accelerating the removal from production of obsolete products, the USSR and RSFSR Goskomtsen's are establishing deductions for industrial products which have been included in the all-state and branch plans and which are subject to removal from production. These deductions will be in the amount of the profit agreed upon when approving the wholesale prices for the products (not less than 10 nor more than 30 percent of the wholesale price). For products not certified for a high or the first category of quality and not considered in the plan for terminating the production of obsolete products, use is made of deductions in the amount of 30 percent of the wholesale price, provided the organs of price formation have not established deductions in other amounts. The associations and enterprises introduce the total amount of the deductions into the budget in the absence of instructions by those organs which approved the prices for these products. During the first 6 months of 1985, 9.6 million rubles worth of deductions from the wholesale prices for industrial products subject to be removed from production, or more by a factor of 1.3 than the amount for 1984 on the whole, were added to the republic's budget.

Experience in the use of deductions from wholesale prices for obsolete products must be expanded in connection with the recertification of industrial products mastered earlier and with the new raised requirements for evaluating the technical level and quality being taken into account. Meanwhile, the data tends to indicate inefficient work by the ministries in recertifying products according to the two categories of quality and also the weak influence exerted on this process by economic sanctions.

In order to accelerate the restoration of products of an industrial-technical nature, the ministries and departments must resolve a number of problems considered to be of fundamental importance for improving the work of certifying products. This applies first of all to improving planning and raising the quality of products, including the indicator for the proportion of high quality products.

Urgent measures must also be undertaken aimed at eliminating existing shortcomings in the certification of products, with special attention being given to the technical level and quality of development of new products and their introduction into production operations. Technological discipline and stability in product quality during the production process must be observed in a strict manner and greater responsibility must be displayed by the certification committees for the validity and correctness of the decisions undertaken.

The interrelationships among structural subunits engaged in standardization and price formation must also be strengthened considerably. This will make it possible to raise the quality of the work concerned with composing and checking the computations on the economic effectiveness of the new equipment, to develop, approve and register in a timely manner the normative-technical documentation and also to present the required materials to the price formation organs for approval of the wholesale prices and the incentive bonuses for adding to them.

An acceleration in the renovation of industrial products and the removal of products from production will be influenced by measures recently undertaken by

RSFSR Minfin /Ministry of Finances/, RSFSR Goskomtsen, the republic's Gosstandart Administration and the RSFSR TsSU /Central Statistical Administration/ aimed at coordinating control over observance by production associations and enterprises of the requirements for product certification and quality, the correctness of use of wholesale prices, bonuses and deductions and also over the timeliness and correctness of budgetary computations and the reliability of accounting data. A broad exchange of information is called for on the production of non-certified and obsolete products by enterprises and production associations, on the wholesale price deduction totals added to budgetary income and also on the exclusion of such products from reports on fulfillment of a sales plan by organs of the TsSU.

The control organs must also intensify control over the timeliness involved in establishing and introducing into the budget deductions from wholesale prices for industrial products of national economic importance, presented by the producing enterprises for certification (re-certification) and which were assigned the first category of quality.

In order to strengthen the effect of prices on raising the quality of equipment and expanding the production of highly efficient products of a production-technical nature, applied during certification to the first category of quality, commencing 1 January 1986 use has been made of deductions from the wholesale price during the 1st year in the amount of 5 percent, the second -- 10 and the third year -- 15 percent. If during the second certification, this product is not assigned to the high category of quality, it is removed from production.

At the same time, the existing system for employing bonuses and deductions did not exert a proper effect with regard to raising the technical level of machine building output. In this regard, when certifying quality and establishing incentive bonuses, the true conformity to the best foreign models should be evaluated in a more objective manner. The prices for new generations of machines must ensure a raised level of profitability, with a considerable improvement in their consumption properties and the production of obsolete equipment should be made unprofitable.

It is our opinion that an increase in the interest of production associations and enterprises in expanding the assortment of high quality products could be promoted by contributions into the economic incentive funds, during the first year of their production, for the entire additional amount of profit obtained as a result of incentive bonuses.

As is known, the responsibility of a producer and consumer for the validity of the economic effect realized from the production of new equipment has been weakened at the present time. It is considered advisable for the amount of the agreed upon economic effect from the production of new equipment to be taken into account in the plan of the producing enterprise and also when approving the task for lowering production costs for the enterprise-consumer.

The inclusion in accounting data on the fulfillment of state plans of low quality products which do not conform to the normative-technical requirements is viewed as a deliberate distortion of accounting procedures and the guilty

parties will be held accountable in conformity with the law. Ideally, a statute should be introduced which would make the leaders and chief bookkeepers personally responsible for the production of poor quality products.

7026
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INDUSTRY PLANNING AND ECONOMICS

DISCUSSION OF ECONOMIC REFORM PROGRESS IN LENINGRAD

Moscow KOMSOMOLSKAYA PRAVDA in Russian 11 Mar 86 p 3

[Article under the rubric "People and the Economy" by V. Andriyanov and A. Afanasyev: "The Strategy of Reorganization"]

[Text] We face the task of doubling the economic potential of the country in fifteen years. What must be done in the first place in order to carry out the task assigned by the party? How is it being resolved practically by the Leningraders - the creators of the "Intensification 90" program? These questions were the starting point for the conversation with two delegates to the 27th Congress of the CPSU - Academician I. A. Glebov and the general director of the Leningrad Metal Plant production association, A. P. Ogurtsov.

"A significant portion of the electric power plants of the country use our turbines," says Anatoliy Petrovich. "Now a task of rapid growth has been set, actually doubling the volume of production. I consider this to be a realistic task. Let me talk about our association. For us an increase in the volume of production by one and a half times is provided for the 12th Five Year Plan. This is a very serious task, which demands the mobilization of all forces. Under the Leningrad regional program "Intensification 90" work is proceeding on raising the productivity of labor through the introduction of advanced equipment, machine tools of the "machining center" type, one-of-a-kind specialized equipment and new technological processes and through reducing manual labor."

I. Glebov: "Doubling requires a great intensification of all kinds of production. The intensification of production is based on new technologies, new equipment and new systems for managing production. In this area too significant work is proceeding in Leningrad. Our program is oriented towards intensifying production through wider automation, the use of data processing equipment and robot technology. All of this we have already tried out to a significant extent; two years of work on the "Intensification 90" program are already behind us. We have no doubts that by the year 2000 the city and oblast of Leningrad will be able to increase the productivity of labor by 2.3 - 2.5 times and to double volume of production.

"At the Leningrad Oblast party conference it was noted that the industry of Leningrad and its oblast had increased the output of numerically controlled machine tools one and one-half times and tripled the output of modules of flexible production systems and "processing centers." It was particularly

emphasized at the conference, however, that the productivity of labor in industry rose half as fast as the capital-labor ratio. That is, there is still an obvious lagging of economic factors behind scientific and technical factors. What is being undertaken in this regard by the Leningraders?"

A. Ogurtsov: "You know, when listening to the political report I first of all set for myself the task of accelerating socio-economic development. This directly affects us machine builders.

"Let me cite the example of the brigade of Vladimir Stepanovich Chicherov, a delegate to the 27th Party Congress.

"His whole brigade - about 80 persons, including engineers technicians and service personnel - went over to the collective contract system in January of this year. Of course, preparations were made for the transition; in January the productivity of labor in comparison with January of the past year rose by 27 percent and wages rose by 17 percent. I must add that at present 82 percent of the workers work in brigades, and now the collective contract will be introduced in the sections. In this connection I would also like to talk about the proposal mentioned in the political report about the creation of councils of labor collectives at enterprises. A council like this is already being established at the Leningrad Metal Plant. It will include representatives of the management, party, trade union and Komsomol organizations, councils of brigades, workers and specialists. This will raise the role of the labor collective.

"Over the past few years our association has participated in two large experiments - the first on improving the compensation for the labor of design engineers and the second was the large-scale economic experiment. With regard to the first experiment the number of engineers and technicians was cut substantially, more than 10 percent, while keeping the same wage fund, the productivity of labor increased by 15 percent and all assignments were fulfilled ahead of the established deadlines."

I. Glebov: "Yes, you are right, modern economic support and the scientific organization of labor are necessary for scientific and technical progress. For example, the group method of organizing production had its origin in the enterprises of our city and spread from there. Group processing technology produces an economic effect that is always perceptible. The productivity of labor is growing significantly. Manual workers are being replaced. And in addition the foundation is being established objectively for all-round automation of the production process."

What hinders and may hinder the acceleration?

Naturally the manager and the scientist have different answers. Let us hear what they have to say.

"For us the main thing is progressive technology and equipment," says A. Ogurtsov. "We have unique machine tools, which are supplied by machine tool plants; these plants too need to be reorganized."

"Does this mean that the suppliers can throw a monkey wrench into all your bold plans?"

"Yes. Take for example the Gomel machine tool plant, which gave us machine tools that are worse than those it supplied previously. It is necessary to create equipment that will increase the customers' labor productivity. This is the approach our collective takes to the creation of turbines."

"And what is the role of youth and its share in the successes of the plant?"

"At our plant young people under 30 make up half of the collective. And this, I think, says it all. The Komsomol takes charge of the most important projects."

"This is the opinion of a plant director. And what does a scientist think in this regard?"

I. Glebov: "Last year there was a rather lively discussion in the Leningrad press about the forms and methods of renovating the compensation of labor and about ways for further improvement of competition. I too took part in the discussion. My article was published in the LENINGRAD RABOCHIY. There in particular I drew attention to the necessity for the real and effective unification of the interests of the person and the enterprise, of society as whole. It is necessary to develop a mechanism for full conformity of payment with the quantity and quality of labor. By means of the form of payment itself growth of productivity must be stimulated. That is, it is necessary above all to encourage those who willingly master new equipment, make rationalizing proposals and, most importantly, continually revise the norms on this basis. Such a method of organization and stimulation, in my opinion, could become an effective lever of acceleration and a powerful economic support for scientific and technical progress.

"When talking about Leningrad and the future of the legendary city, one cannot help recalling its heroic past. And therefore the question to the Leningraders about the harsh wartime years was to be expected. And they talked about them. One was taken out over the Road of Life as a young boy. Another lived through the starvation, cold, bombing and shelling.

"And I happened to liberate Leningrad as a part of the Volkhov Front; at that time I was the commander of an artillery battery," Igor Alekseyevich Glebov said. "The battles were extremely fierce and intense. And I think the efforts of our country to preserve the peace meet the greatest reponse in the hearts of those who went through those hard wartime years and saw the countless disasters caused by war. Therefore we completely support our party and government, which strive to remove the threat of nuclear war, so that mankind can greet the 21st century."

12893
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METAL-CUTTING AND METAL-FORMING MACHINE TOOLS

SPECIAL CARE FOR NEW EQUIPMENT URGED

Tbilisi MOLODEZH GRUZII in Russian 14 Jan 86 p 1

[Article by unknown author: "Special Care for New Equipment"]

[Text] The Communists of the Batumi Electromechanical Plant, one of the largest in the country producing machines for floor transportation, initiated the slogan "Party cares for the assimilation of new equipment," directed toward obtaining the maximum effect from introducing new equipment. On the party organization's initiative here, there was installed the first robotized press complex in Adzharin which made it possible to quadruple the output of housing parts for electrical loaders. A section with 14 NC machine tools was placed in operation. Over 100 control programs for NC machine tools were developed in the special plant bureau. The party organization outlined a plan for the new year to expand the pool of automatic machine tools and also introduce five robot complexes and seven NC machine tools.

Electrical carts with lifting capacities of two to ten tons, manufactured by the Batumi Plant are irreplaceable at the loading sections of marine and river ports, RR stations, airports, metallurgical enterprises and construction sites. They determine greatly the rates of technical progress and the quality of labor in the national economy of the country. Therefore, the Batumi workers strive to improve the technological and operational characteristics of their output and make it easier to control. The introduction of technical novelties and proposals by plant innovators facilitated an increase in the share of products awarded the Government Emblem of Quality which now makes up 86.5 percent of the total volume of production.

In this work the Batumi workers also paid great attention to the "human factor." In fact, the acceleration of the introduction of the achievements of scientific technological progress assumes maximum interest of each worker in the total business. Workers, engineers, innovators and inventors are trying to work in a new way with a full output. Communists, young Communist League members and all workers of the advanced enterprise -- are on the precongress labor watch.

2291
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METAL-CUTTING AND METAL-FORMING MACHING TOOLS

GOMEL MACHINE TOOL BUILDING PLANT RECEIVES AWARD

Minsk SOVETSKAYA BELORUSSIYA in Russian 15 Mar 86 p 1

[Article by BELTA, Gomel: "Monitoring the Tempo"]

[Text] From the simplest construction fixtures to modern NC machining centers -- this was the road taken for 100 years by the Gomel Machine Tool Building Plant imeni S. M. Kirov. In the history of this labor collective, the glorious history of the development of the Soviet State was reflected as in a mirror. Under the guidance of Bolsheviks the plant workers participated in three revolutions, defending the young Soviet State with guns in their hands. During the Great Fatherland War the enterprise evacuated the manufacture of "Katyusha" mortars and ammunition to the rear.

At present the plant is the leading supplier in the CEMA of abrasive-cutting and slotting machine tools equal to the best specimens in the world. They are exported to more than 60 countries. In the previous five-year plan period alone the enterprise renovated 90 percent of its output. It was all of the highest class of precision.

For the successes achieved in manufacturing progressive equipment, fulfilling the plant indicators and in connection with the 100th Anniversary of the establishment of the Gomel Machine Tool Building Plant imeni S. M. Kirov, it was awarded the Order of the Red Labor Banner. This great award was handed to the collective on 14 March by B. V. Balmont, the USSR Minister of the Machine Tool Building and Tool Industry. "Accepting the Fatherland's award, each of us recognizes that we cannot rest on today's achievements," stated G. M. Kazakov, plan director and delegate to the 27th Congress of the CPSU. "The party congress posed a complicated and responsible problem for machine-builders -- the development and assimilation of a new generation of high-efficiency equipment. We have no time to waste. In the current five-year plan period we must double the output. We should stress primarily the manufacture of NC machine tools of the machining center type. By 1990 we must produce 500 such units and organize the production of flexible production modules and systems. The implementation of this modernization of production capacities has begun. Fifty million rubles were allotted for this purpose.

W. L. Shvarov, turner-borer, Hero of Socialist Labor; V. V. Ivanov, turner; Z. M. Burova, die forger; and others spoke on the solemn occasion and stressed

that the successful realization of the problems posed by the 27th party congress will depend on stricter discipline and greater efficiency at each work position. At the solemn meeting a group of workers, engineers and technicians and employees were given citations and medals.

Ye. N. Chernyshev, deputy department manager of the CPSU Central Committee and A. S. Kamay, first secretary of the Gomel obkom participated in the work of this meeting.

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METAL-CUTTING AND METAL-FORMING MACHINE TOOLS

BRIEFS

NC MACHINE TOOLS -- At the Baranovichsk Machine Tool Accessories Plant outdated equipment is being replaced by new modern equipment, thus increasing the productivity of labor by automating machining processes. One main way to solve this problem is NC machine tools. The greatest precision is achieved in the time-saving of machining complicated shape parts. Recently multipurpose metal-working machining centers were installed in the enterprise. They had a great effect. If before, say, twelve operations on various machine tools were required to manufacture the disk of a machine tool chuck, now only one operation is required and machining time is reduced from 20 hours to 6 hours. [Text] [Minsk NARODNOYE KHOZYAYSTVO BELORUSII in Russian No 2, Feb 86 p 19] 2291

1823/184

OTHER METALWORKING EQUIPMENT

NEW AND MODERNIZED FORGES, PRESSES

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODTSVO in Russian No 1 Jan 86 pp 18-20

[Article by V.Ya. Baturkin: "Basic Trends for Increasing the Productivity of Forge and Press Machinery Produced by the Voronezh Forge and Press Equipment Production Association imeni M.I. Kalinin"]

[Text] One of the most important ways in which the productivity of forge and press equipment can be increased is through the use of automated complexes. This has become a very critical task now that the country's labor resources have ceased to grow at a very high rate.

The Voronezh Association has been working to solve three different problems:

-- to improve the technical quality of existing forge and press machinery;
-- to master the use of new types and sizes of forges and presses;
-- and to equip them with systems for mechanization, automation and numerical control.

Forge and press processes are being modernized in order to improve their dynamic characteristics, make it easier to maintain them, enhance their reliability and increase their service life. Steam-driven and pneumatic drive hammers are being modernized with special regard to making them more energy-efficient and to provide them with more advanced control systems. The improved technical quality of these forges and presses has made them 120 percent more productive.

The association is working to master the production and use of forge and press machinery that has never been produced before or is of substantially different design and form. For example, work is planned to assimilate 6300-kN open double-crank presses (20 cycles per minute, 250-mm stroke, 800 mm high stamping space, stamping space height regulation within 200 mm, table dimensions of 5090 x 700 mm), forging roll gammas for transverse-helical rolling with interaxial spacing of 500, 630, 800 mm and other types of advanced equipment.

The given equipment helps make it possible to introduce advanced technological processes and increases forge and press output by 150 percent.

The mechanization, automation and numerical control of forge and press equipment determines the level of production and creates a basis for assimilation of flexible automated production.

The association has devised a large-scale program for increasing the productivity of the equipment it produces by an average coefficient for 1985 of 1.4 in comparison to 1980. At the same time, by increasing the overall percentage of automated equipment, the program is supposed to increase machine productivity by 240 percent.

An experimental model of an automated 2500-kN high-speed punch press is being manufactured. Meanwhile, the experimental AKSV1235 hot roll-forging complex and the L113.51.300 slitting line have been developed. The production of mechanized and automated forge and press machinery in 1980 was 230 percent higher than in 1980 and the production of programmable industrial robots therefore rose by 200 percent.

It must be mentioned that while in the 10th Five-Year period the task of automating forge and press equipment was solved mainly through the use of series-manufactured 1000-kN KD2330 press, in the 11th Five-Year Period, all of the associations equipment has been mechanized and automated: closed and open one- and two-crank presses, forging rolls, perforated presses, steam-driven forge and stamping hammers have been formed into complexes that make broad use of industrial robots and manipulators. All of this has made it possible in 1985 to bring up the output of automated and mechanized machinery to a level of 35-40 percent of overall production.

A 1000-kN single-crank open press was used to assimilate a family of mechanized machinery and complexes that use a roller feed, band feeder, devices to assure straight uncoiling, and three-armed robots. Therefore, the problem of mechanizing most of the technological operations performed by the given press have been basically solved.

Figures 1a, 1b and 1c show complexes based on a 1000-kN single-crank open press and table 1 presents the technical and economic data on this family of complexes.

The production of complexes based on 1600-8000 kN double-crank open and closed presses and a 20-kg manipulator has been mastered. Figure 2 is a photograph of a complex based on a AKKV3732A-1 double-crank closed 1600-kN press.

The given complexes are designed for cold sheet stamping from large piece blanks in automobile and tractor production, agricultural machine building and other branches of the national economy.

Complexes based on closed 5000- and 8000-kN double-crank presses have been made to stamp parts from rolled material (table 2).

To mechanize hot roll-forging operations, the model AKSV1237 and S0240 complexes have been assimilated. These are based on rollers with an

interaxial spacing of 500 (figure 3a) and 1000 mm (figure 3b) and are equipped with programmable automatic manipulators (table 3).

To mechanize free forging and hot die forging, the association has created the AKM1343A.01 free-forging complex that includes a two-ton steam-driven hammer and and 400-kg manipulator. The association plans to assimilate hot die-forging complexes based on a 1600-kg steam-driven stamping hammer. The hammer is equipped with a programming system, electronics for monitoring the hammer force and the process of completion of stamping according to height, an automatic lubricating system and a forging ejector. The complex will include a trimming press, automatic blank heater, robots and other auxiliary equipment.

Aside from the above, the association will be conducting research work to create control systems for steam-driven and pneumatic drive hammers, new types of equipment for hot die forging and Impaktor-type bilateral-impact hammers.

The association's experience in the production of automated and roboticized manufacturing complexes, sections and lines has made it possible for it to start work on a higher level o automation -- the production of flexible production modules.

During the first stage of this work, there will be created a flexible production module for sheet-metal stamping band material and piece blanks. The module will be based on a 1000-kN single-crank open press.

The association's experience so far will be used in the creation of flexible production modules based on double-crank open and closed presses, rollers and stamping hammers and in the creation of higher-level flexible production systems.

In order to complete its work on flexible production systems of all levels, the association is strengthening and expanding its ties to various scientific research institutes and design organizations.

1 Модель	2 Средства механизации	3 Размер заготовки, мм	4 Толщина заготовки, мм	5 Производительность, шт/мин	6 Коэффициент роста производительности	7 Экономический эффект, тыс. руб.
8 АККЕ2330.21 (рис. 1,а) 9 АККЕ2330.01 (рис. 1,б) 10 АККЕ2330.31	Полосоправитель 14 Валковая подача и правильно-разматывающее устройство 15 Робот 16	1200×90—2000×250 Лента до 18	0,8—3 0,5—2,5	60—90 100	2,55 1,33	69,0 [illegible]
РТУ2 КД2330.02.02 11 (на базе двух прессов рис. 1,в) L521.42-100 12 (на базе трех прессов) L521.41.100 13 (на базе четырех прессов)	Роботы 17	1100×100—450×500 1400×100—450×500 1100×100—450×500 1100×100—450×500	0,5—5,0 0,5—5,0 0,5—5,0 0,5—5,0	10—11 10—15 10—15 10—15	1,0 1,1 1,37 1,56	0,0 [illegible] [illegible] [illegible]

Table 1. Technical and economic indicators of sheet-metal stamping complexes based on a 1000-kN single-crank open press. Key: 1) model; 2) means of mechanization; 3) blank dimensions, mm; 4) blank thickness, mm; 5) output, units/minute; 6) coefficient of increased output; 7) economic effect, rubles x 10^{-3}; 8) AKKE2330.21 (figure 1a); 9) AKKE2330.01 (figure 1b); 10) AKKE2330.31; 11) RTU2 KD2330.02.02 (based on two presses, figure 1b); 12) L521.42-100 (based on three presses); 13) L521.41.100 (based on four presses); 14) band feeder; 15) rolling feed and rolling straightener; 16) robot; 17) robots; 18) band up to 250.

1 Модель	2 Средства механизации	3 Усилие пресса, кН	4 Размер заготовки, мм	5 Толщина заготовки, мм	Производительность, шт/с	6 Коэффициент роста производительности	7 Экономический эффект, тыс. руб.
8 АККВ3732А-1 9 АКК6Д3534А-1 10 АКК3535А-1 11 АКК6-3537.31 12 АКК-В3539.31 13 АКК-31321-1 14 АКК-3034-1 15 АКК-3537.01 16 АКК-В3539.01 17 КО5.9139.01	Манипулятор для штучных заготовок грузоподъемностью 20 кг 19 Валковая подача и правильно-разматывающее устройство 20	1600 2500 3150 5000 8000 1600 2500 5000 8000 8000	630×400—1200×750 800×400—1250×750 800×400—1250×750 850×500—1700×1000 850×500—1700×1000 675×360—1250×600 800×400—1200×750 Лента 150—700 Лента 150—710 Лента 750—1600	0,8—6 0,8—6 0,8—6 0,8—6 0,8—6 0,8—6 0,8—6 1—2 1—2 0,8—3	850 860 860 624 624 860 860 600 600 609	3 3 3,11 2,71 2,75 2,4 2,4 2,08 2,33 3,2	75,1 [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Table 2. Technical and economic indicators for sheet-metal stamping complexes based on double-crank presses. Key: 1) model; 2) means of mechanization; 3) press force, kN; 4) blank dimensions, mm; 5) blank thickness, mm; 6) output, units/minute; 7) coefficient of increased output; 8) economic effect, rubles x 10^{-3}; 9) AKKV3732A-1; 10) AKKB3534A-1; 11) AKK3535A-1; 12) AKKB3537.31; 13) AKKV3539.31; 14) AKK3132A-1; 15) AKK3034-1; 16) AKK3537.01; 17) AKKV3539.01; 18) KO5.9139.01; 19) 20-kg manipulator for piece blanks; 20) roller feed and straightener; 21) band.

1 Модель	2 Средства механизации	3 Межосевое расстояние валков, мм	4 Номинальное усилие, кН	5 Частота вращения валков, об/мин	6 Наибольший диаметр заготовки, мм	7 Наибольшая длина заготовки, мм	8 Коэффициент роста производительности	9 Экономический эффект, тыс. руб.
10 АКСВ1235	11 Автоматический манипулятор 14	320	630	75	70	820	1,8	22,4
12 АКСВ1237		500	1250	48	120	960	2,73	34,5
С0240		1000	4000	30	180	4800	2,73	80,7
13 К500		800	150	90	30	300	1,3	16,1

Table 3. Technical and economic indicators for hot roll-forging rollers and complexes. Key: 1) model; 2) means of mechanization; 3) interaxial spacing of rollers, mm; 4) nominal force, kN; 5) roller speed, rpm; 6) maximum blank diameter; 7) maximum blank length; 8) coefficient of increased output; 9) economic effect, rubles x 10^3; 10) AKSV1235; 11) AKSV1237; 12) S0240; 13) K500; 14) automatic manipulator.

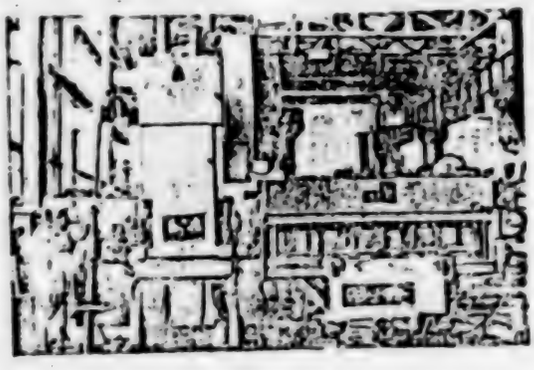


Figure 1a

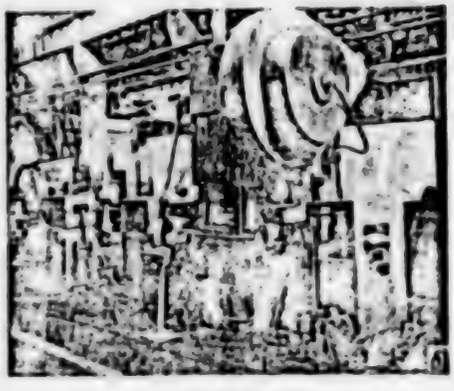


Figure 1b

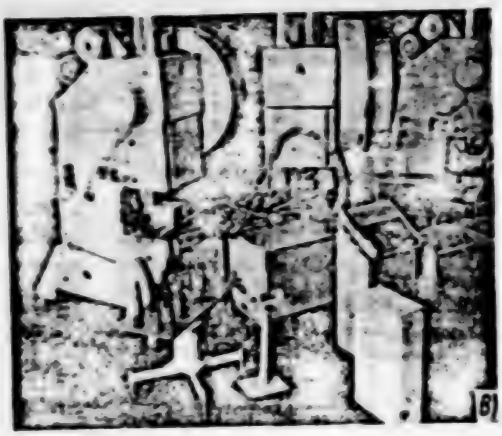


Figure 1c

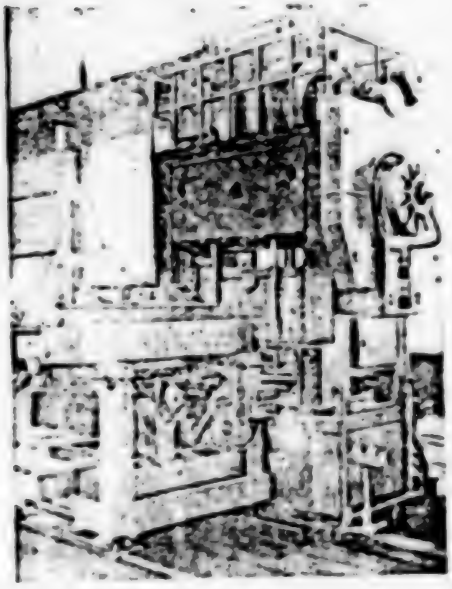


Figure 2

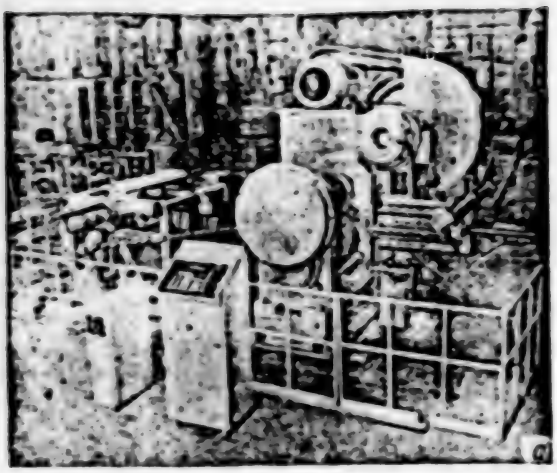


Figure 3a

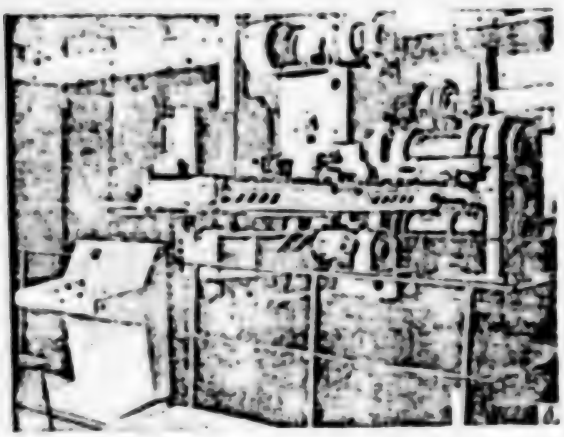


Figure 3b

12261
CSO: 1823/127

OTHER METALWORKING EQUIPMENT

ELECTRICAL-HYDRAULIC IMPULSE STAMPING IN SERIES PRODUCTION

Moscow KUZNECHNO-SHTAMPOVOCHNOYE PROIZVODSTVO in Russian No 1, Jan 86 p 23

[Article by N.V. Starkov, A.N. Sizev, A.V. Tsvetkov: "Electrical-Hydraulic Impulse Stamping in Series Production"]

[Text] Electrical-hydraulic impulse stamping is widely used for single-lot and series production.

Experience in the introduction and operation of general-purpose electrical-hydraulic impulse presses has shown that in large-lot production, one can find parts that are much better manufactured using these presses, especially because the large amount of time spent on auxiliary operations is reduced. These parts include those manufactured by expansion from cylindrical blanks or barrel blanks. Some factories have studied the possibility of using hydraulic-electrical impulse presses to make samovar bodies with ornamented surfaces.

The samovar bodies were manufactured using T1220 and T1223 serial general-purpose hydraulic-electrical impulse presses. However, only experimental samples were produced or small lots of souvenir articles. The factories did not manage to eliminate the low level of productivity of the general-purpose serial presses. With all of this in mind, the USSR Academy of Sciences Electrical Design Bureau has built the special-purpose T1226 press from a general-purpose T1223 hydraulic-electrical impulse press used to stamp parts of complex form from barrel blanks.

In order to increase the productivity of this unit, it was equipped with a four-position rotary device holding four sets of jointed matrices. At the first position, the barrel blank is set into the matrix and it is filled with water at the second. In the third position, the jointed parts of the matrix are fixed and the part is stamped while at the fourth position, the finished part is removed from the matrix.

As the device turns from the third to the fourth position and from the fourth to the first, the matrix halves are rinsed off.

The use of the rotary device has made it possible to coincide the installation, removal and filling of the part with its deforming while a new matrix can be introduced into the working space at the same time that the used matrix is removed from the stamped part.

The T1226 has two current impulse generators (GIT 10-20/400 UKhP4 and TU 88USSR 91.015-76). The same generators are also used with the T1223 but this model can only use one of the two. With the T1226, the generators operate using one electrode therefore they are switched on separately which makes it possible to increase the frequency of the pulse sequence and therefore the productivity.

The installation operates semiautomatically.

The operator visual checks the quality of the finished part without removing it from the matrix. If the part has not been completely stamped, it is passed a second time through the installation at a fewer number impulses. Defects caused by blank shipment or previous machining operations and dents, etc. are easily corrected by the T1226.

Characteristic forms of defects with this installation (amounting to less than two percent) are rupture of the part body due to material defects or poor annealing and pulling of the blank flange within the matrix due to non-observance of its dimensions in preceding operations.

The installation comes equipped with enough spare parts for one year of operation.

In comparison to the general-purpose T1223 and T1220 presses with their similar design features, the more intensive level of operation of the T1226 required certain revisions and additions.

Matrix strength was practically the first problem encountered. Experience has shown that under extended operation, flaws form in the vicinity of the angular chamfers of the section face in the matrix and these leave marks on the stamped parts and therefore require the matrice repair. The flaws are formed by liquid working its way into the space between the matrix and the blank. Since this phenomena has only been found in the lower part of the matrix, the matrix material is not disturbed in any way in the same areas of the upper part. It must be pointed out that when the matrices were manufactured, there was an insufficient number of openings to allowing air to escape and it was found that more openings were needed not only to produce a better surface quality on the stamped part but also to strengthen the matrices. Once the number of openings was increased to allow more air to escape, matrix strength improved.

An operating defect of the T1226 hydraulic-electrical impulse press its its noisiness which, even though it does meet established job-safety standards, does tend to tire its operators. This means that special measures must be taken to reduce noise in the operator's work zone. The operation of the T1226

to manufacture bodies for samovars has shown how efficiently it can be used for series and large-lot production.

12261
CSO: 1823/127

AUTOMATED LINES AND AGGREGATED MACHINING SYSTEMS

UDC 62-2(083.72):658.52.011.56.012.3

SELECTION OF NOMENCLATURE OF MACHINED PARTS IN STAGED DEVELOPMENT OF FLEXIBLE AUTOMATED PROCESSES

Moscow STANKI I INSTRUMENT in Russian No 12, Dec 85 pp 2-3

[Article by V.G. Serebrennyy]

[Abstract] A method is proposed for selecting parts in order to determine the sequence in which to develop flexible automated processes in the staged automation of production. The method is based on systems analysis, and makes allowance for the importance for the process as a whole of the fabricated articles and the influence of the parts making up the most important articles on the output of the latter. The proposed method is best for designing flexible production systems for newly developed processes. The recommended sequence for the staged creation of a flexible production system is to analyze the nomenclature of produced articles and determine the demand for them, to determine the amount of machine tools required for all of the parts making up the articles on the list, to divide the assortment of parts by classes and groups, calculate the amount of machinery required, the number of parts, and the importance of each group of parts, to rank the groups of parts and isolate the most important group, to calculate the required number of machines in the system, to draw up a schedule for the integrated production of parts within the framework of the production system, and to develop technical requirements imposed on non-automated processes and the configuration service. Tables 3, references 2: 1 Russian, 1 Western.

6900/12379
CSO: 1823/113

ROBOTICS

UNIVERSAL ROBOT DESCRIBED

Moscow MATERIALNO-TEKHNICHESKOYE SNABZHENIYE in Russian No 12, Dec 85 p 43

[Untitled unattributed article]

[Text] The Mogilev "Tekhnopribor" Plant is known as a large supplier of industrial manipulators with large technological possibilities. Among equipment novelties of the enterprise is the "Tur-10" technological universal robot with a lifting capacity of 10kg. The robot not only does loading-unloading operations, welds, assembles, removes fins, but also can be trained. For this the operator demonstrates the operation of some process, while the "brain" center of the robot records everything on a magnetic tape. After the automatic control system is switched in, the "Tur-10" can operate without interruption for 160 hours.

The plant has manufactured over 50 such robots. They work successfully at enterprises and scientific research organizations where flexible automatic systems are being finished off. Taking into account the constantly increasing demand, robot production will increase.

Design engineer Irina Dubinina "trains" the "Tur-10".

2291
CSO: 1823/158

ROBOTICS

UDC 007.52:65.011.56

ALLOCATION OF INDUSTRIAL ROBOTS BY PRECISION CATEGORIES

Moscow STANDARTY I KACHESTVO in Russian No 3, Mar 86, pp 34-36

[Article by M. N. Yakovleva, candidate of technical sciences: "Classifying Industrial Robots by Precision Categories"]

[Text] Today, the park of robots has grown substantially and become more diverse in the types of models. Hence, one of the current tasks of robot engineering is to develop an industrial robot classification.

There are already classifications of robots in terms of various features [1,2]: the nominal load-lifting capacity, maneuvering capability, the method of installation at the work site, the type of drive system, the type of control system, the method of programming, and the type of coordinate system. However, there is still no strict classification of industrial robots (PR) in terms of precision, even though a number of the basic specifications include the absolute positioning error, which is a characteristic of the PR precision.

In general terms, PR precision may be understood as both positioning accuracy and accuracy of repeating certain motions or paths. In the first case, we may assess the accuracy in terms of the static error, in the second case the dynamic error or the speed error. The static positioning error and the speed error result from different sources. While the static error is primarily determined by the precision of manufacture of the individual mechanical linkages, deformation under the influence of static loads and the weight of the robot itself or the influence of thermal stress, and static errors of the control system, including the feedback components, the speed error is primarily governed by the structure of the control system and its quality. There is no fixed relationship between the static and the dynamic errors. It is probably advisable to include the static and the dynamic errors in a number of industrial robot specifications.

Usually, the PR precision is estimated in terms of the static positioning error. However, it is necessary to point out that, in certain situations, the speed error becomes paramount; e.g., in industrial robots for painting and welding, PR with contour control, as well as robots servicing continuously-moving convevor belts. Thus, the industrial robots designed to pick up television kinescopes, carry them and place them onto a moving conveyor belt should function without overregulation and should arrive at their destination

with zero speed in terms of one coordinate and constant speed in terms of another.

Hereafter, by PR precision we shall understand the static accuracy, defined in terms of the absolute positioning error.

The first robots often employed a pneumatic drive, enabling a sufficiently good positioning accuracy. This was often achieved by the use of mechanical stops and bang-bang control. With such control, the number of positioning points is limited. The first pneumatic industrial robots were characterized by large size. This is explained by the fact that the power elements, specifically the pneumatic cylinders, were often components of the supporting structure, which stiffened the requirements for minimum allowable deformation and rigidity of the PR elements.

Thus, high positional accuracy of the robots JUNIOR and KAUFELDT AB was achieved by mechanical stops for the halting (the positioning error of the robot JUNIOR was 0.1 mm, that of KAUFELDT AB was 0.04 mm; these were manufactured in 1968 and 1972, respectively).

Recently, industrial robots often employ an electric drive, which is characterized by different principles of control: in particular, point-to-point control. There is practically no use of stops, such as provide the high positioning accuracy in PR with pneumatic drive.

The absolute positioning error of industrial robots with electric drive is better than that of PR with pneumatic drive (table); an exception is the industrial robot MRU-901, the high positioning accuracy of which is achieved by bang-bang control.

The static positioning error is proportional to the linear dimensions of the PR. As already mentioned, the static error is primarily a function of the manufacturing precision of the individual mechanical elements and the static deformation of the mechanisms and mechanical linkages. Therefore, it is advisable to classify PR in terms of accuracy as a function of the ratio of the absolute positioning error and the linear dimensions of the manipulator. In the general case, the linear dimensions of the PR components are proportional to the dimensions of the work zone and the maximum maneuvering distances of the robot.

An identical positioning error for different maximum maneuvering distances characterizes a different degree of accuracy of an industrial robot. Thus, the positioning error of 0.5 mm of the robot SM 160 F2.05.01, having a maximum maneuvering distance of 8900 mm, may be regarded as small, and it may be assigned to the category of relatively precise robots. At the same time, the lower positioning error of 0.1 mm of the robot Ritm-01.01, which has a maximum maneuvering distance of 150 mm, characterizes a lower robot precision. Here, we may draw an analogy with the precision of part manufacture in mechanical engineering. Thus, a technology producing the same part allowance will differ in accordance with the dimension of the part.

Specifications of several models of industrial robots

(a) Модель	(b) Тип привода	(c) Грузоподъемность, кг	(d) Максимальное перемещение L, мм	Δ, мм	δ, %	(e) Назначение ПР
МРУ 901 (f)	Э	0.02	10	0.02	0.2	4
ПРЭМ-0,5 (g)	Э	0.5	400×60	0.2	0.05	4
Универсал 5 02 (h)	Э	5	640×400	1.0	0.16	2
ПРЭМ-5	Э	5	1200×300	0.2	0.17	3
РПМ-25 (i)	Э	25	1000	0.5	0.05	1
Ритм 01 01 (j)	П	0.1	150×50×50	0.1	0.07	1
МП-9С (k)	П	0.2	130×30	0.2	0.13	1.2
МП-11	П	1	200×65	0.1	0.05	1.2
Цикло 5 01 (l)	П	5	850×250×100	0.1	0.0125	1.2
Бриг-10Б (m)	П	10	600×100×200	0.3	0.05	6
894 80 65	П	25	5000×1300	5	0,1	6
Колер (n)	Г	3	2000	3	0.15	5
КМ 10Ц 42 01 (o)	Г	10	700×300	0.5	0.08	1
Универсал 15 08	Г	15	1000×400	2	0.2	1.2
КМ 40 31 01	Г	40	1060	0.5	0.05	1
УМ 160Ф2 81 01 (p)	Г	160	1600	0.5	0.003	2
СМ 160Ф2 05 01 (q)	Г	160	8900×700	0.5	0.006	3
PUMA 260	Э	0.9	400×725	0.005	0.0008	4
MAKER	Э	2.3	900×1000	0.1	0.01	4
PUMA 560	Э	2.5	900×1560	0.1	0.008	4.7
Motoman L 3c	Э	3	900×1200	0.1	0.008	6.7
Nachi Unimat 8600 AK	Э	34	1900×2110	0.1	0.05	7
JUNIOR	П	5	500×150	0.1	0.02	6
KAUFELDT AB	П	5	1250×300×150	0.04	0.003	1.3
RS—1 (IBM Corp)	Г	2.3	450×425×1450	0.2	0.015	4

Key:

a. Model
b. Type of drive
c. Load-lifting capacity, kg
d. Maximum maneuvering distances L, mm
e. Designation of PR
f. MRU-901
g. PREM-0.5
h. Universal-5.02
i. RPM-25
j. Ritm-01.01
k. MP-9S
l. Tsiklon 5.01
m. Brig-10B
n. Koler
o. KM 10Ts.42.01
p. UM 160F2.81.01
q. SM 160F2.05.01

DESIGNATIONS: Δ - absolute positioning error; δ - adjusted positioning error. Type of drive: Э - electromechanical, П - pneumatic, Г - hydraulic. Designation of PR: 1 - servicing of pressing and forging equipment, 2 - automatic servicing of metalworking lathes, 3 - automatic isothermal hardening, servicing of galvanizing vats, 4 - automatic welding, installation, sorting, measurement monitoring, 5 - automatic painting and application of coatings, 6 - automatic transport, loading/unloading and warehouse work, 7 - automatic welding.

The influence of the allowance on the operational features of the parts will also be different for different dimensions. The experience of lathework shows that a manufacturing technology becomes more complicated and expensive with increasing size of the parts, on the one hand, and decreasing allowance, on the other. Numerous investigations in this field have demonstrated a linear relationship between the allowable tolerance and the dimensions of the work, given an identical technological complexity and equipment cost.

In our opinion, in order to classify PR according to precision we must distinguish several classes in dependence on the ratio between the absolute positioning error and the maximum maneuvering distances. The values of the specified maximum maneuvering distances and absolute positioning errors should be included in the nomenclature of the PR specifications, which are mandatory in all types of documents according to State Standard 25378-82. The allowable numerical values of the nominal absolute positioning errors and maximum maneuvering distances of PR have been established in State Standard 26062-84.

Pursuant to this, possible values of the adjusted positioning errors δ have been calculated as the ratios between the numerical values of the absolute positioning errors Δ authorized by State Standard 26062-84 and the allowable numerical values of the maximum linear maneuvering distances L:

$$\delta = \frac{\Delta}{L} 100\ \%.$$

The adjusted positioning errors have been converted to the normal form. A normal series R10 was selected for the maximum maneuvering distances, as in the case of the absolute positioning errors.

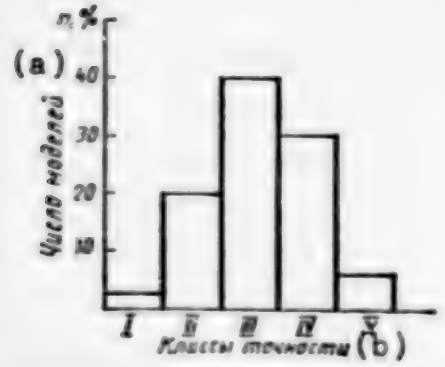
Furthermore, the adjusted positioning errors have been calculated for known industrial robot models (Soviet and Western). The values of the adjusted errors are shown in the table for several models. In all, more than 200 PR models were considered.

On the basis of a point analysis, it is proposed to distinguish the following precision classes of industrial robots.

PR with adjusted positioning error (δ) less than 0.0025 percent are assigned to robots of precision class I, those between 0.0025 and 0.01 percent to class II, between 0.01 and 0.05 percent to class III, between 0.05 percent and 0.25 percent to class IV, and above 0.25 percent to class V.

The figure shows a histogram of the distribution of the industrial robot park over the precision classes.

Arrangement of the PR in precision classes will allow a particularization of the precision and, accordingly, the cost requirements for component parts; in other words, the industrial robot manufacturing "culture."



Histogram of the distribution of the PR park over precision classes.

Key:

a. Number of models

b. Precision classes

The proposed precision classification of PR will promote a standardization of component parts and modules for PR and a development of standard size series. The assembly of PR from standardized units and modules will, of course, greatly simplify and lower the cost of the designs and facilitate the routine operations. Particularization of precision requirements is especially effective with the modular robot design principle.

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ROBOTICS

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DEVELOPMENT PROSPECTS FOR STANDARDIZED INDUSTRIAL ROBOT TESTING METHODS

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[Article by Ye. G. Nakhapetyan: "Prospects for the Development of Standardized Methods of Testing Industrial Robots"]

[Text] The series manufacture of manipulators of industrial robots (PR), started at a number of plants, and the vast prospects for their universal use in conditions of integrated automation in industry, urgently demand a careful development of experimental research and test methods. The principal goals of such testing are to ascertain the manufacturing certificate information, quantitatively determine and compare the quality criteria for robots of the same type, obtain the necessary data for development of a mathematical model and computer-aided investigation of such, and quantitatively determine the factors governing the operational and malfunctioning states of the robots, as well as the factors necessary to inspection and diagnostics.

Despite the apparent simplicity of these experimental requirements, there are considerable difficulties associated with the multiple-part designs of the working components, the large number of degrees of freedom, the diversity of designs, the difference in the types of drive system, and the lack of a suitable testing layout.

We should add to this the fact that robot testing in the USSR and in the West is done by different procedures, often without adequate statistical verification of the necessary number of experiments.

In view of all the above, the Institute of Machine Science of the USSR Academy of Sciences has been working on a standardization of the testing. The standardized procedure identifies that portion of the testing that must be done in both experimental and factory conditions. It has been worked out on the basis of the experience in testing of industrial robots and manipulators with electromechanical, hydraulic and pneumatic drives in laboratory and factory conditions of the machine building, automotive and other industrial sectors. The procedure of abbreviated kinematic and dynamic testing involves oscillography of the velocities, accelerations and small displacements of the tip of the working element, the current strength in the electric motor (direct current) and, in robots with pneumatic and hydraulic drives, the pressures in both cavities of the cylinders or pneumatic and hydraulic motors.

In accordance with the procedural recommendations for testing of industrial robots as developed by the Institute of Machine Science (IMASh) of the USSR Academy of Sciences and the ENIMS (Experimental Research Institute of Metal Lathes) of the Ministry of the Lathe Industry in 1983, the experimental testing procedure includes static and expanded precision testing, recording of signals from the control system for more accurate determination of the time intervals and coordinated operation of the working elements, recording of pressures over various segments of the pneumatic and hydraulic system and forces in the elements for localization of faults, recording of the power of the electric motors or the current strength and the speed of revolution of the motor shaft, investigation of the vibrational-acoustic characteristics, measurement of temperature and so on. These investigations are done prior to the reliability and durability testing and are periodically repeated over the service life, which helps establish correlations between the parameters of dynamic quality, operating time until failure and wear on the parts of the robot mechanism. During the routine operation, these correlations are investigated during the testing before and after repairs of the mechanism, when it is possible to study the nature of the wear.

The principal difference between the kinematic and dynamic testing procedure and the previous conventional procedures is the determination of the speed of response as a function of the level of specifications and precision [1] and the path of linear or angular displacement of the grip. Such technique eliminates subjectivity in the evaluation of quickness of response and speed of operation.

The investigations [2] have established that the speed of operation, or the average speed of the robot tip, is most influenced by the path of this tip. In the case of a short path comprising one tenth of the maximum displacement, the average speed is usually several times lower than the certificate value. Such decrease in speed must be taken into account in the robot design process, especially for robots with adaptive control systems, which are characterized by a search mode during which the motion cycle of the grip of the arm includes a series of small consecutive motions dictated by the sensor system [2].

The weight of the arm has somewhat less influence on the speed of operation. However, the influence of this weight affects the precision, so that care must be taken in optimizing the drive system and lowering of the weight of the arm parts, while at the same time assuring a rigidity, the aim being to lower the ratio between the total weight of the arm and the weight of the transported article or equipment, especially through the use of composite materials.

The influence of a given positioning accuracy depends substantially on the parameters of the oscillatory system of the manipulator, including the dampening forces. In a number of tested industrial robot designs, oscillations of the grip lowered the average speed by as much as a factor of 2.

Testing has established that hardware techniques of optimizing the control system can substantially increase the speed of operation, reduce the dynamic

loads and assure a stable adjustment. Quantitative specification of the parameters and indication of the test procedure in the instructions eliminate lengthy training of the operating personnel. The same applies to the adoption of instrument diagnostic methods.

The basic types of industrial robot defects are: incorrect formulation of the law of motion, inadequate dampening and rigidity of the terminal elements, mistakes in the assembly, profiling and manufacture of parts of the pneumatic and hydraulic equipment, as well as mistakes in the adjustment of this equipment and the control system, inadequate power of the drive, imbalance of parts, gaps, large friction forces [1,2].

For routine operation, it is essential to develop compact instruments for quick adjustment and diagnostic testing at the workplace, in particular, sensors of accelerations, pressures, forces and displacements with built-in microamplifiers. Some of the diagnostic testing may be done with experimental equipment involving subsequent computer data processing. In this case, either the certificate information or various quantities indirectly determining the work capacity or type of defects may be used as the norms: correlation factors, spectral characteristics, allowable changes in time intervals over individual segments of the work program, and so on.

Special attention should be paid to built-in diagnostic systems, making use of tachogenerators, detectors of displacements and forces of the PR sensory system and control system, as well as special sensors installed at preselected locations of the pneumatic and hydraulic system or in the cabinet of the control system.

Portable external diagnostic equipment should also be developed for monitoring of the precision and kinematic parameters of PR lacking built-in diagnostic systems under operating conditions.

Adoption of the methods of quality evaluation [3] and dynamic test methods of PR under design and already in manufacture will substantially shorten the fault-finding and adjustment time, both during assembly and in operation. It will enable repairs only as actually needed and in lower volume, and will assure a high reliability of robotic manufacturing sections.

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ROBOTICS

BRIEFS

'ARM' FOR ROBOT -- A reliable "arm" for a robot was created by scientists of the Mathematics and Mechanics Institute of the Kazakh SSR Academy of Sciences and Kazakh State University imeni S. M. Kirov. They dispensed with the traditional model -- a man's limb, considered a standard tool for gripping, lifting and transfering loads. Even the most perfect electronics used by scientists could not eliminate vibrations and malfunctions in the actuator of the robot in the course of operation. The relatively large weight of the motors installed in the "elbow joints" was quite troublesome. Kazakh scientists found that an open system, which is a mechanical analog of a man's arm, can be made considerably stronger and more stable if the structure that ties its joints is changed and it is made lighter. The research people proposed the installation of a multilink articulated mechanism which made it possible to eliminate the motors used to drive parts of the arm. At the same time, the mechanism closed the system of the arm joints by connecting the actuator to the base. This made it possible to use only one motor mounted on the base. This reduced the weight of the structure, raised the lifting capacity and increased its accuracy and speed. The theoretical research at the basis of an entire family of high class mechanisms has found application not only in robot equipment. For example, the Experimental Plant of the Kazakh State University manufactured the first lot of lifts. These devices, occupying an area slightly larger than a desk, are capable of lifting one ton to the seventh floor of a building in several seconds. [Text]
[Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 26 Jan 86 p 2] 2291

STEERING ROBOT ON TRACTOR -- Leningrad -- The motor operates only in optical turns if it is controlled by an automatic device created by the scientists of the Leningrad Agricultural Institute and engineers of the "Kirovskiy zavod" Association. Installed in the cab of a tractor the mini-robot copies the movement of the machine depending upon the topography of the surface. The first such electronic partner, installed on tractor "K-701," passed the test successfully in the fields of the Rostov "Manychskiy" Sovkhoz. Another tractor equipped with a microprocessor, is used on one of the farms in Estonia. At present, the Leningrad people are designing steering robots for a new lot of steel plows which have just left the conveyor of the tractor-building firm. According to calculations by economists, the productivity of the "Kirov" tractors will increase by eight percent, while each twentieth hectare of arable land will be plowed on the fuel saved because of the selection of the best version of movement. [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Feb 86 p 1] 2291

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